FIG. 1

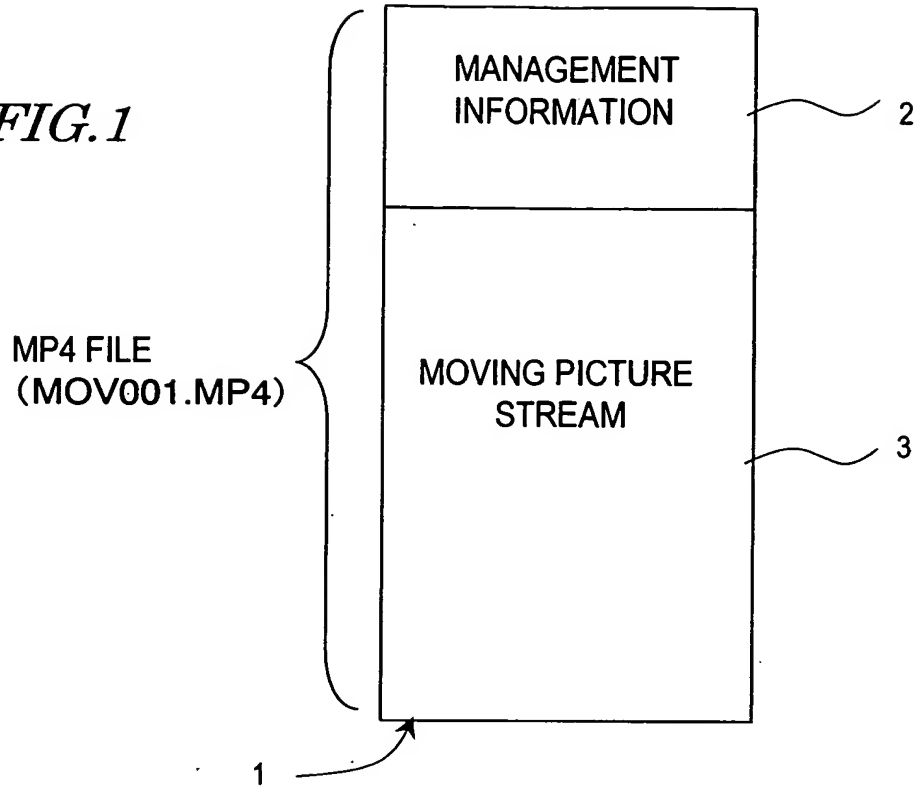

MANAGEMENT INFORMATION
2
MP4 FILE (MOV001.MP4)
MOVING PICTURE STREAM
3
1

FIG. 2

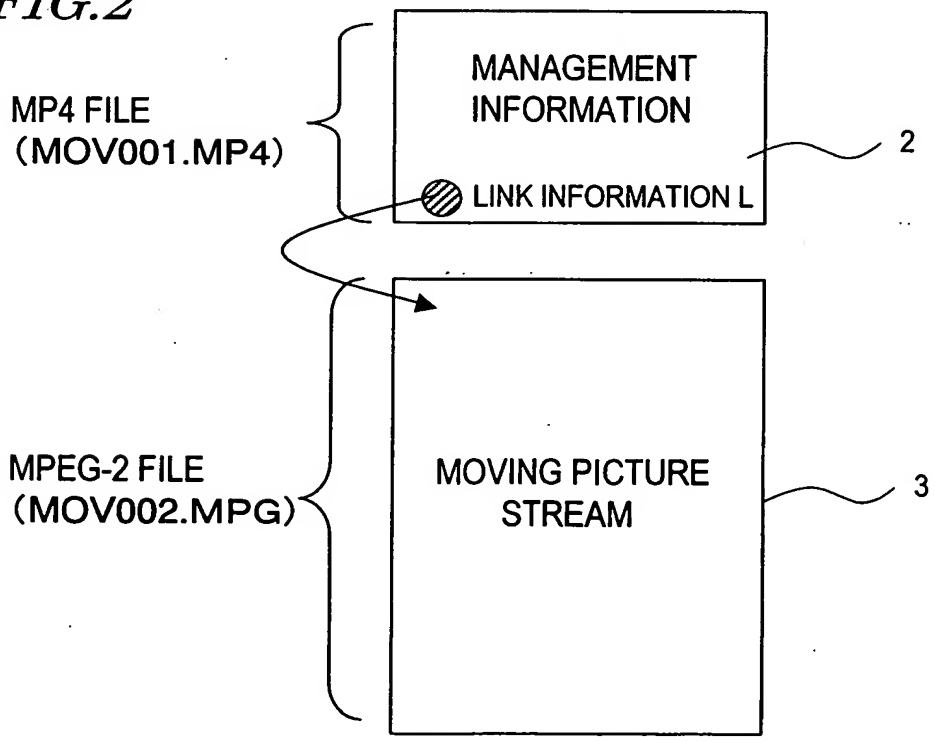
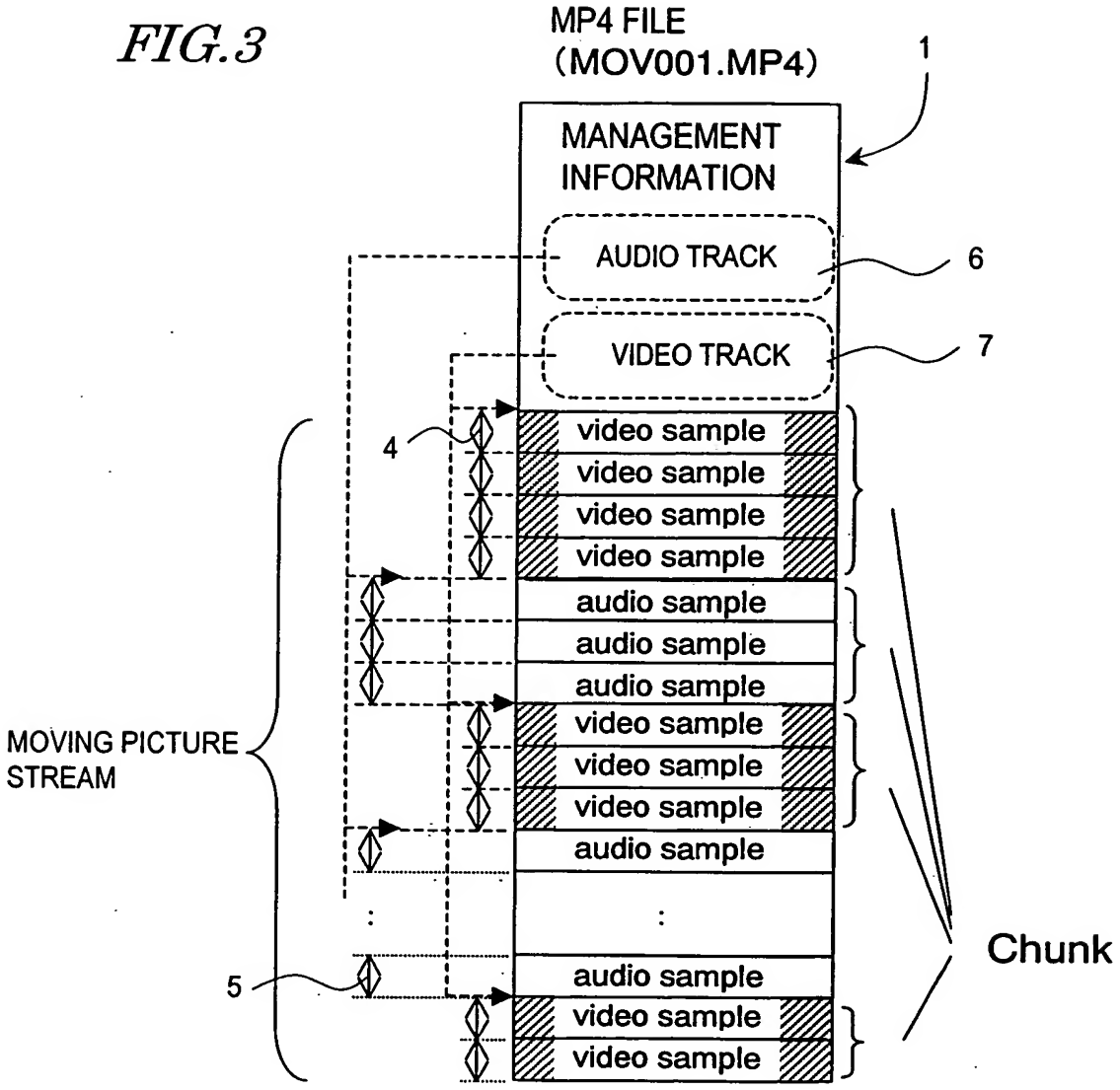

MANAGEMENT INFORMATION
2
MP4 FILE (MOV001.MP4)
LINK INFORMATION L
MPEG-2 FILE (MOV002.MPG)
MOVING PICTURE STREAM
3

FIG.3


MP4 FILE
(MOV001.MP4)
1
MANAGEMENT INFORMATION
AUDIO TRACK
6
VIDEO TRACK
7
4
video sample
video sample
video sample
video sample
audio sample
audio sample
audio sample
video sample
video sample
video sample
audio sample
audio sample
video sample
video sample
MOVING PICTURE STREAM
5
Chunk

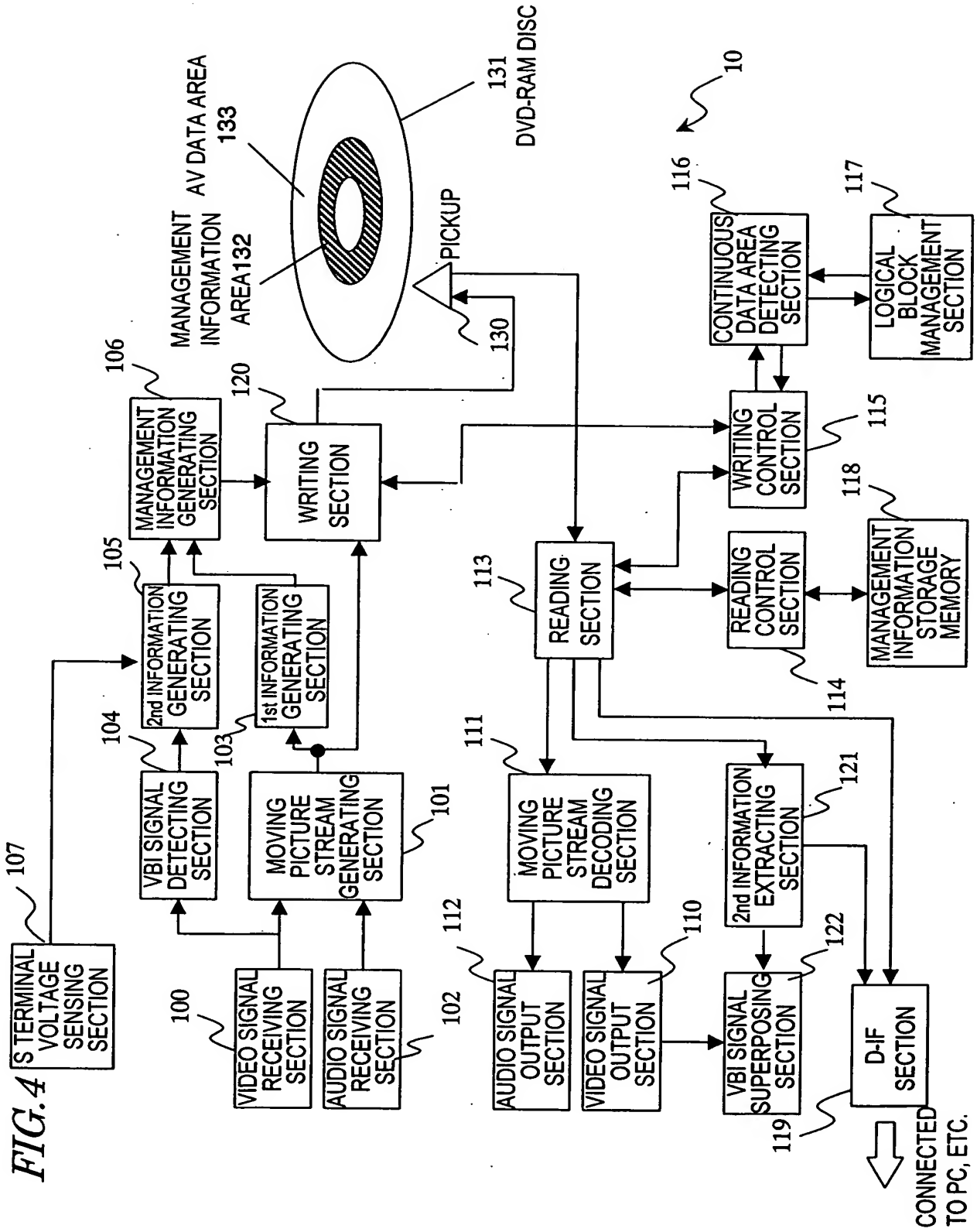

10
131
DVD-RAM DISC
AV DATA AREA
133
MANAGEMENT INFORMATION AREA132
PICKUP
130
120
WRITING SECTION
106
MANAGEMENT INFORMATION GENERATING SECTION
105
2nd INFORMATION GENERATING SECTION
104
VBI SIGNAL DETECTING SECTION
103
1st INFORMATION GENERATING SECTION
101
MOVING PICTURE STREAM GENERATING SECTION
107
S TERMINAL VOLTAGE SENSING SECTION
100
VIDEO SIGNAL RECEIVING SECTION
102
AUDIO SIGNAL RECEIVING SECTION
116
CONTINUOUS DATA AREA DETECTING SECTION
117
LOGICAL BLOCK MANAGEMENT SECTION
115
WRITING CONTROL SECTION
118
MANAGEMENT INFORMATION STORAGE MEMORY
113
READING SECTION
114
READING CONTROL SECTION
111
MOVING PICTURE STREAM DECODING SECTION
121
2nd INFORMATION EXTRACTING SECTION
112
AUDIO SIGNAL OUTPUT SECTION
110
VIDEO SIGNAL OUTPUT SECTION
122
VBI SIGNAL SUPERPOSING SECTION
119
D-IF SECTION
CONNECTED TO PC, ETC.

FIG. 4

FIG.5

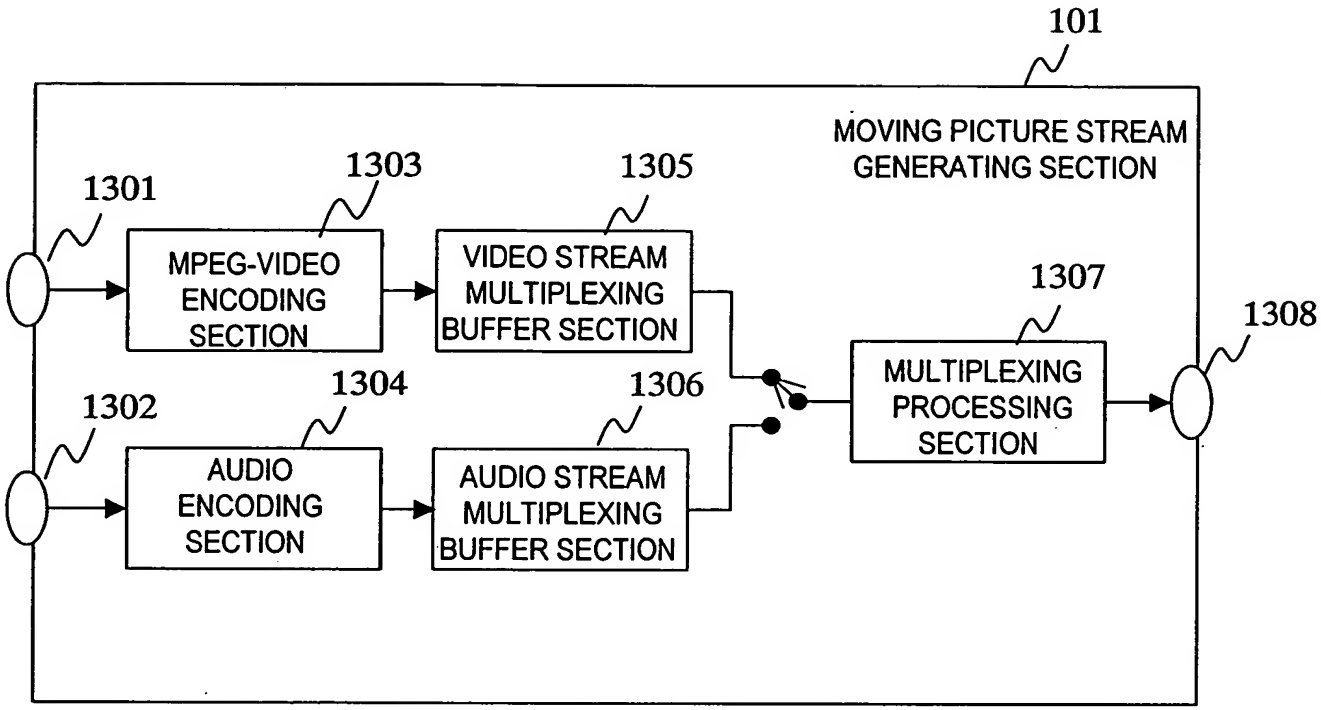

101
MOVING PICTURE STREAM GENERATING SECTION
1301
1303
1305
MPEG-VIDEO ENCODING SECTION
VIDEO STREAM MULTIPLEXING BUFFER SECTION
1307
1308
MULTIPLEXING PROCESSING SECTION
1302
1304
1306
AUDIO ENCODING SECTION
AUDIO STREAM MULTIPLEXING BUFFER SECTION

FIG.6

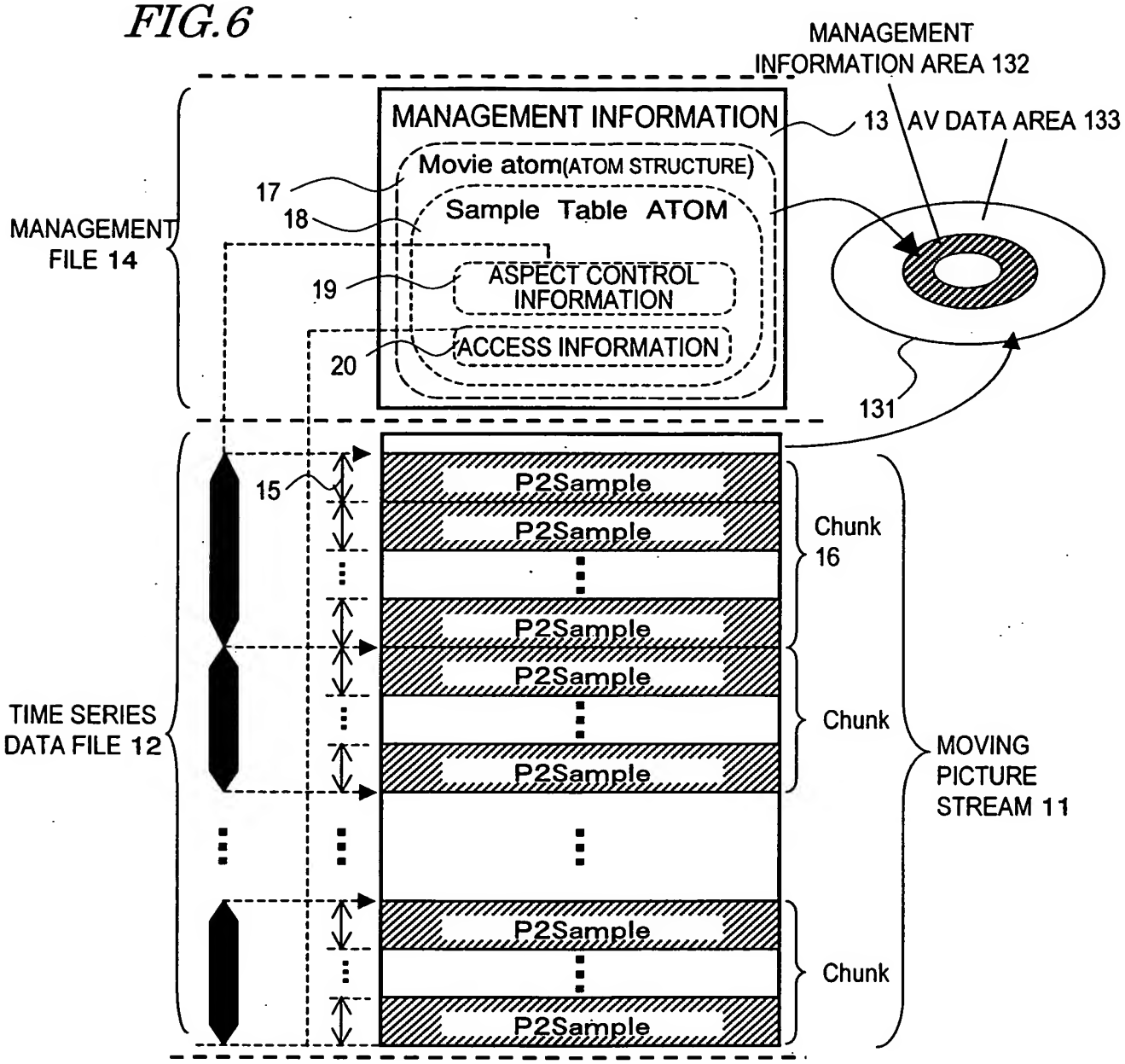

MANAGEMENT INFORMATION AREA 132
MANAGEMENT INFORMATION
13
AV DATA AREA 133
Movie atom(ATOM STRUCTURE)
17
Sample Table ATOM
18
MANAGEMENT FILE 14
ASPECT CONTROL INFORMATION
19
ACCESS INFORMATION
20
131
15
P2Sample
Chunk 16
Chunk
TIME SERIES DATA FILE 12
MOVING PICTURE STREAM 11

FIG. 7

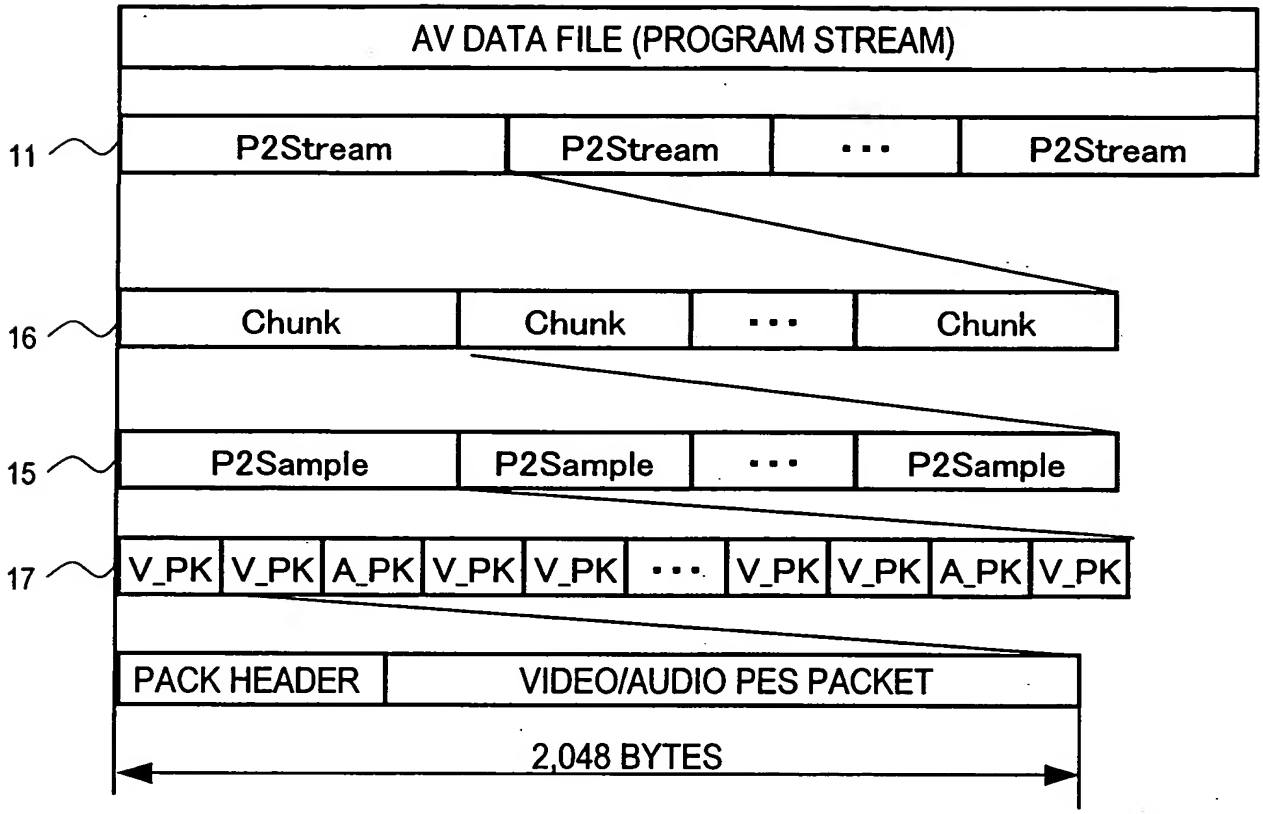

AV DATA FILE (PROGRAM STREAM)
11
P2Stream
P2Stream
• • •
P2Stream
16
Chunk
Chunk
• • •
Chunk
15
P2Sample
P2Sample
• • •
P2Sample
17
V_PK
V_PK
A_PK
V_PK
V_PK
• • •
V_PK
V_PK
A_PK
V_PK
PACK HEADER
VIDEO/AUDIO PES PACKET
2,048 BYTES

FIG. 8

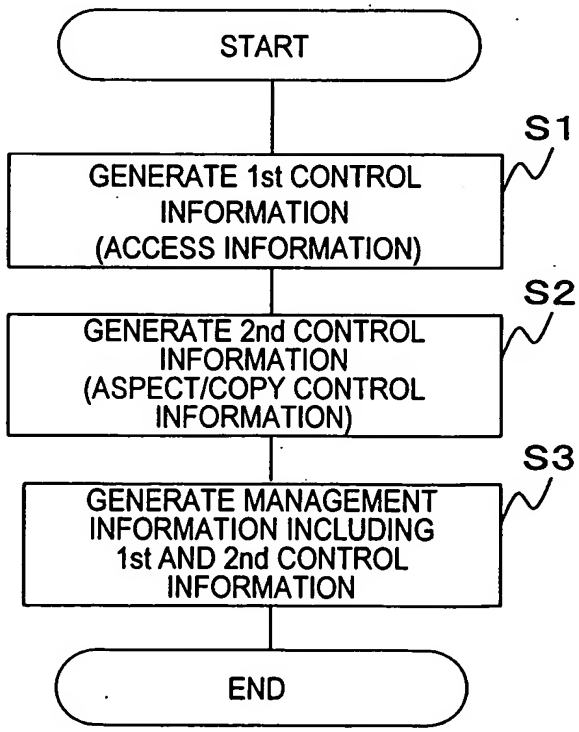

START
S1
GENERATE 1st CONTROL INFORMATION (ACCESS INFORMATION)
S2
GENERATE 2nd CONTROL INFORMATION (ASPECT/COPY CONTROL INFORMATION)
S3
GENERATE MANAGEMENT INFORMATION INCLUDING 1st AND 2nd CONTROL INFORMATION
END

FIG.9

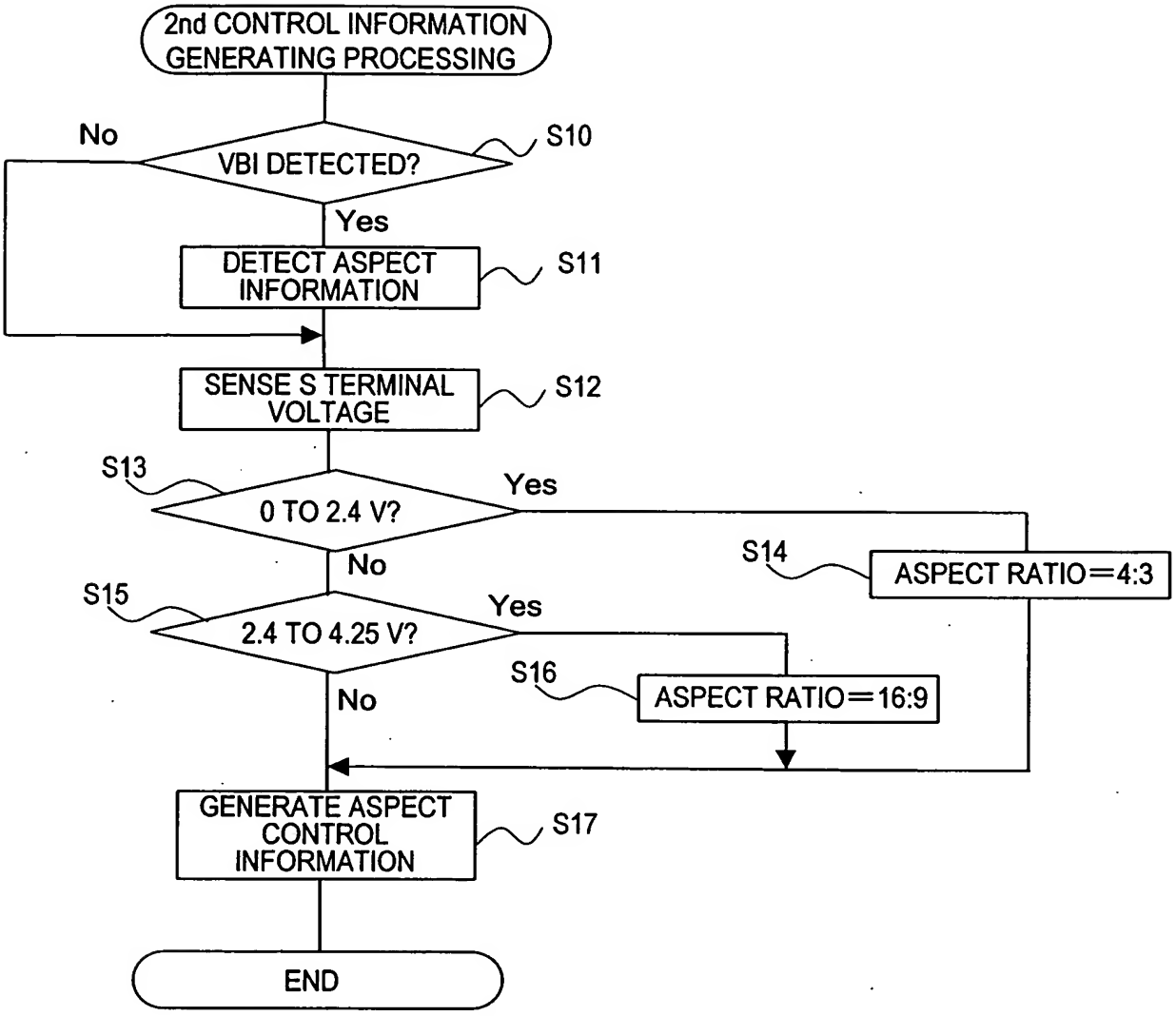

2nd CONTROL INFORMATION GENERATING PROCESSING
VBI DETECTED?
S10
No
Yes
DETECT ASPECT INFORMATION
S11
SENSE S TERMINAL VOLTAGE
S12
S13
0 TO 2.4 V?
Yes
No
S14
ASPECT RATIO=4:3
S15
2.4 TO 4.25 V?
Yes
No
S16
ASPECT RATIO=16:9
GENERATE ASPECT CONTROL INFORMATION
S17
END

FIG. 10

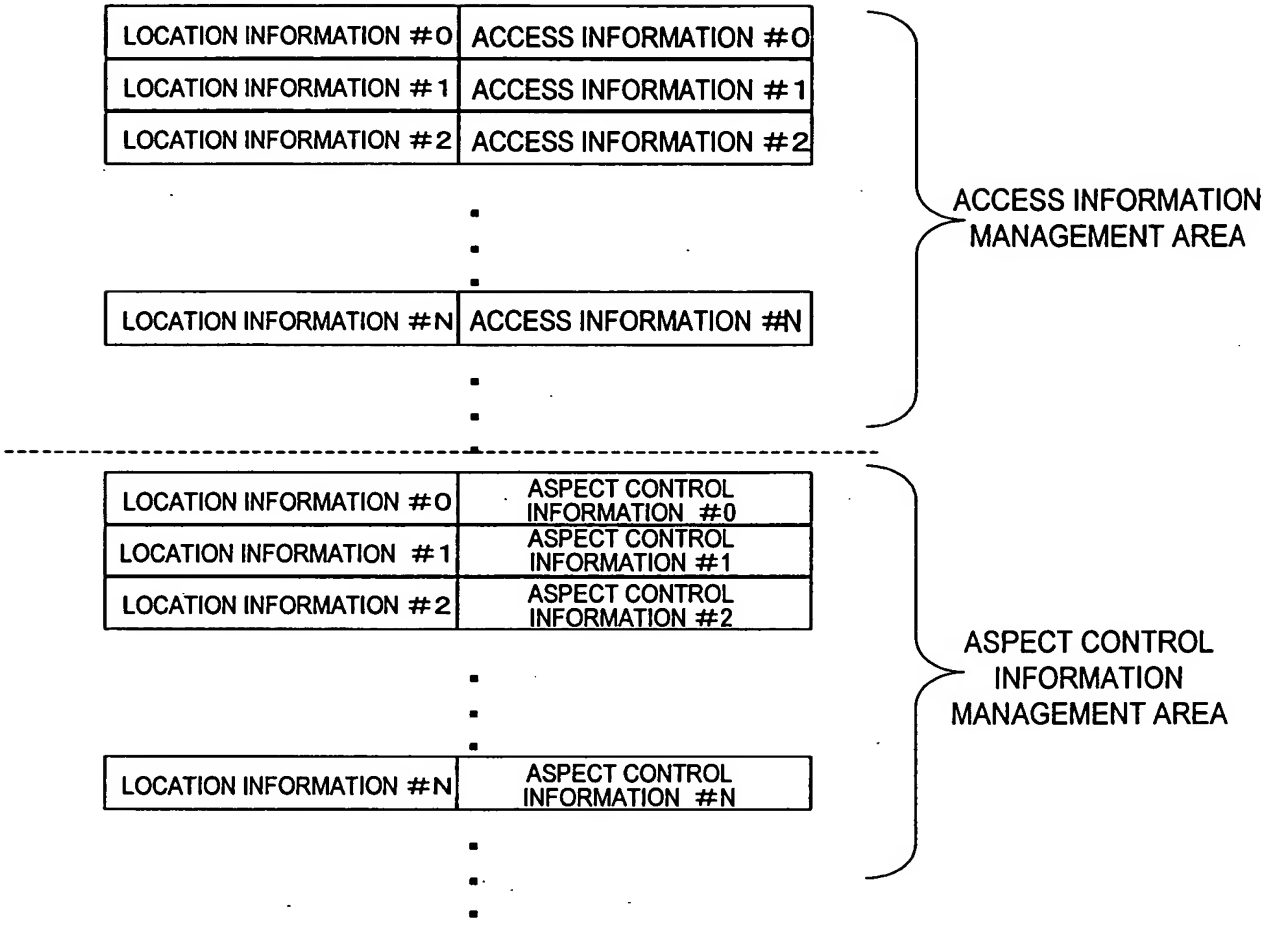

LOCATION INFORMATION #0
ACCESS INFORMATION #0
LOCATION INFORMATION #1
ACCESS INFORMATION #1
LOCATION INFORMATION #2
ACCESS INFORMATION #2
LOCATION INFORMATION #N
ACCESS INFORMATION #N
ACCESS INFORMATION MANAGEMENT AREA
LOCATION INFORMATION #0
ASPECT CONTROL INFORMATION #0
LOCATION INFORMATION #1
ASPECT CONTROL INFORMATION #1
LOCATION INFORMATION #2
ASPECT CONTROL INFORMATION #2
LOCATION INFORMATION #N
ASPECT CONTROL INFORMATION #N
ASPECT CONTROL INFORMATION MANAGEMENT AREA

FIG. 11

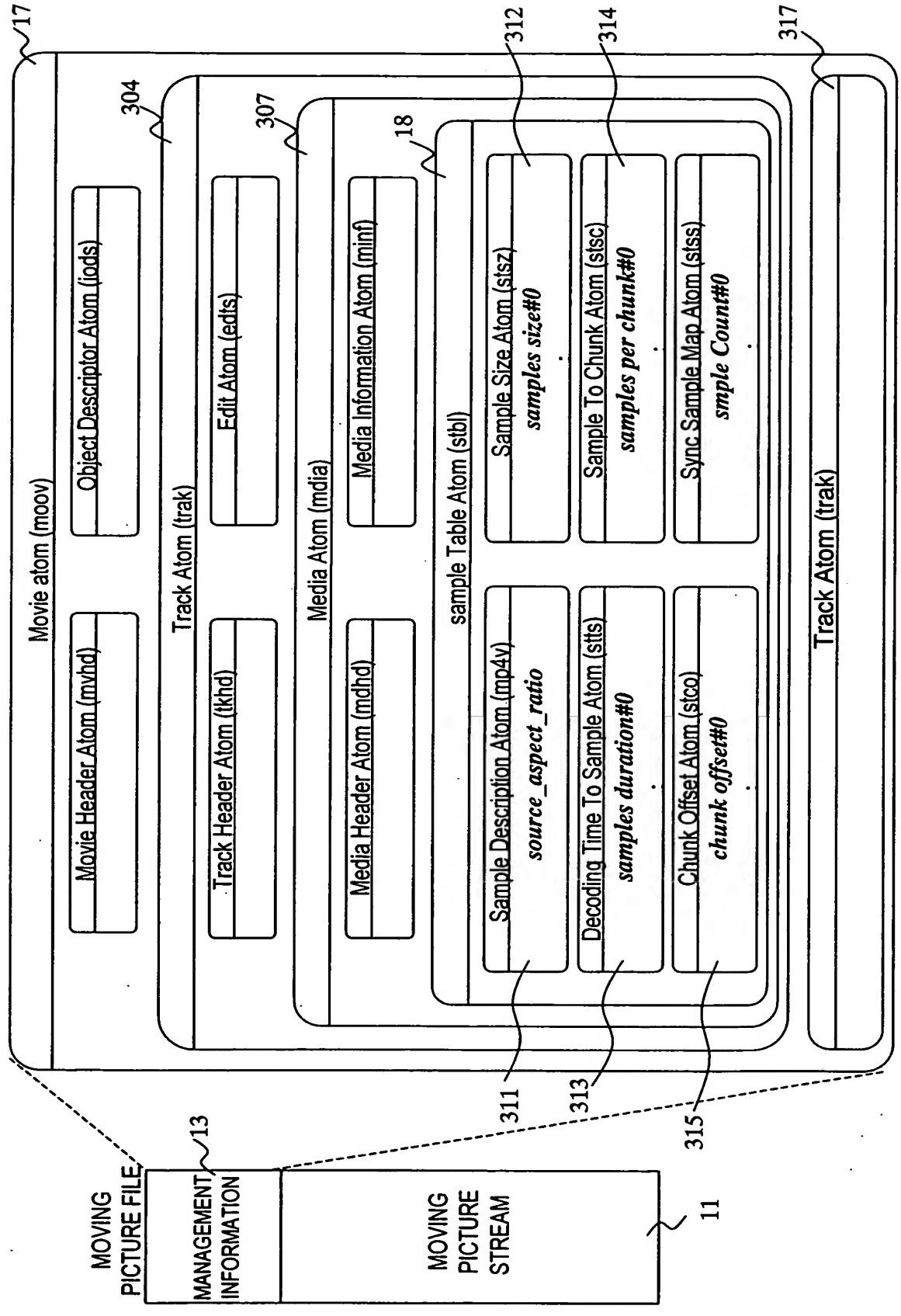
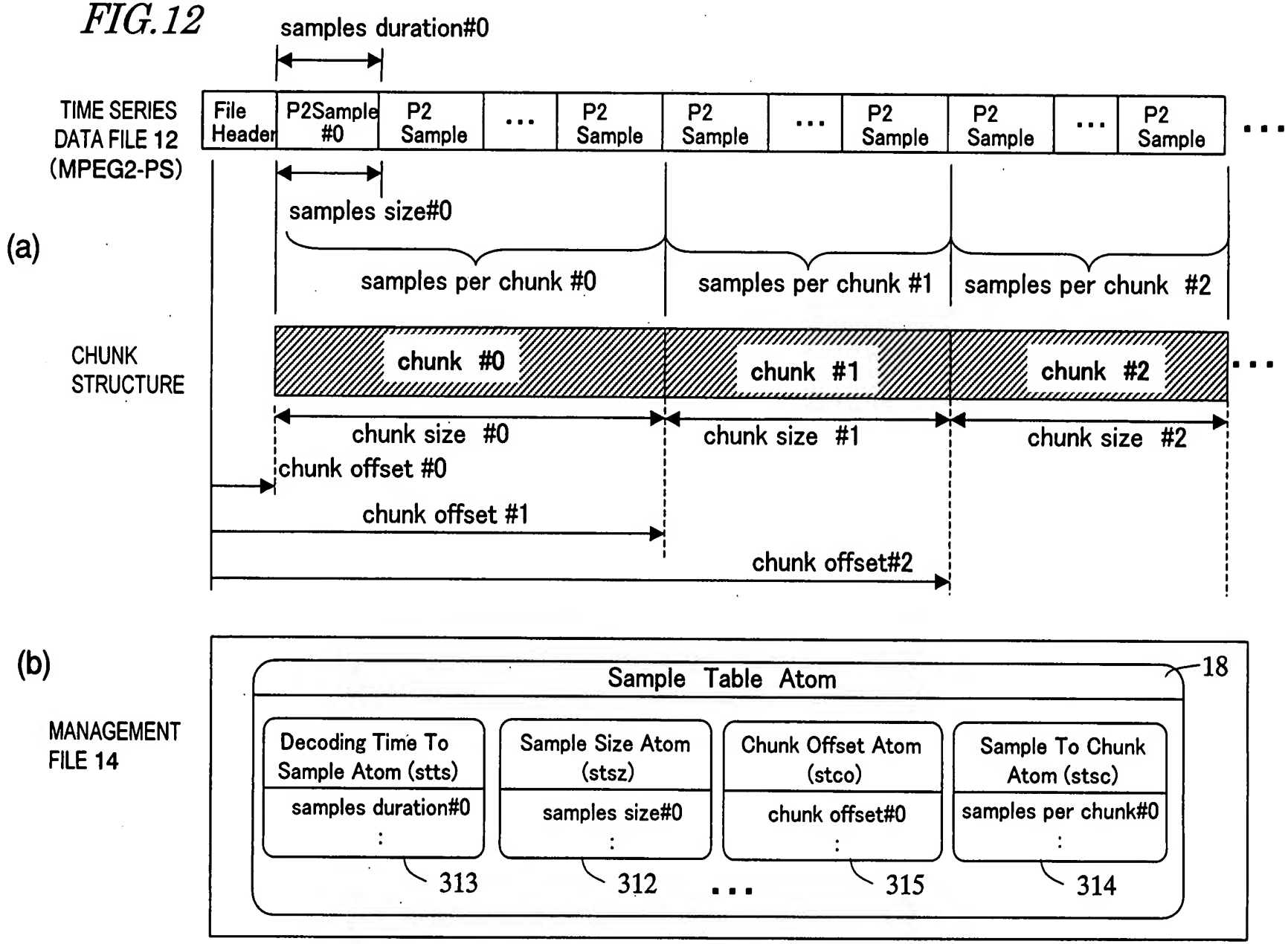

MOVING PICTURE FILE
MANAGEMENT INFORMATION
13
MOVING PICTURE STREAM
11
Movie atom (moov)
17
Movie Header Atom (mvhd)
Object Descriptor Atom (iods)
Track Atom (trak)
304
Track Header Atom (tkhd)
Edit Atom (edts)
Media Atom (mdia)
307
Media Header Atom (mdhd)
Media Information Atom (minf)
sample Table Atom (stbl)
18
Sample Description Atom (mp4v)
source_aspect_ratio
311
Decoding Time To Sample Atom (stts)
samples duration#0
313
Chunk Offset Atom (stco)
chunk offset#0
315
Sample Size Atom (stsz)
samples size#0
312
Sample To Chunk Atom (stsc)
samples per chunk#0
314
Sync Sample Map Atom (stss)
smple Count#0
Track Atom (trak)
317

FIG. 12



10/528165

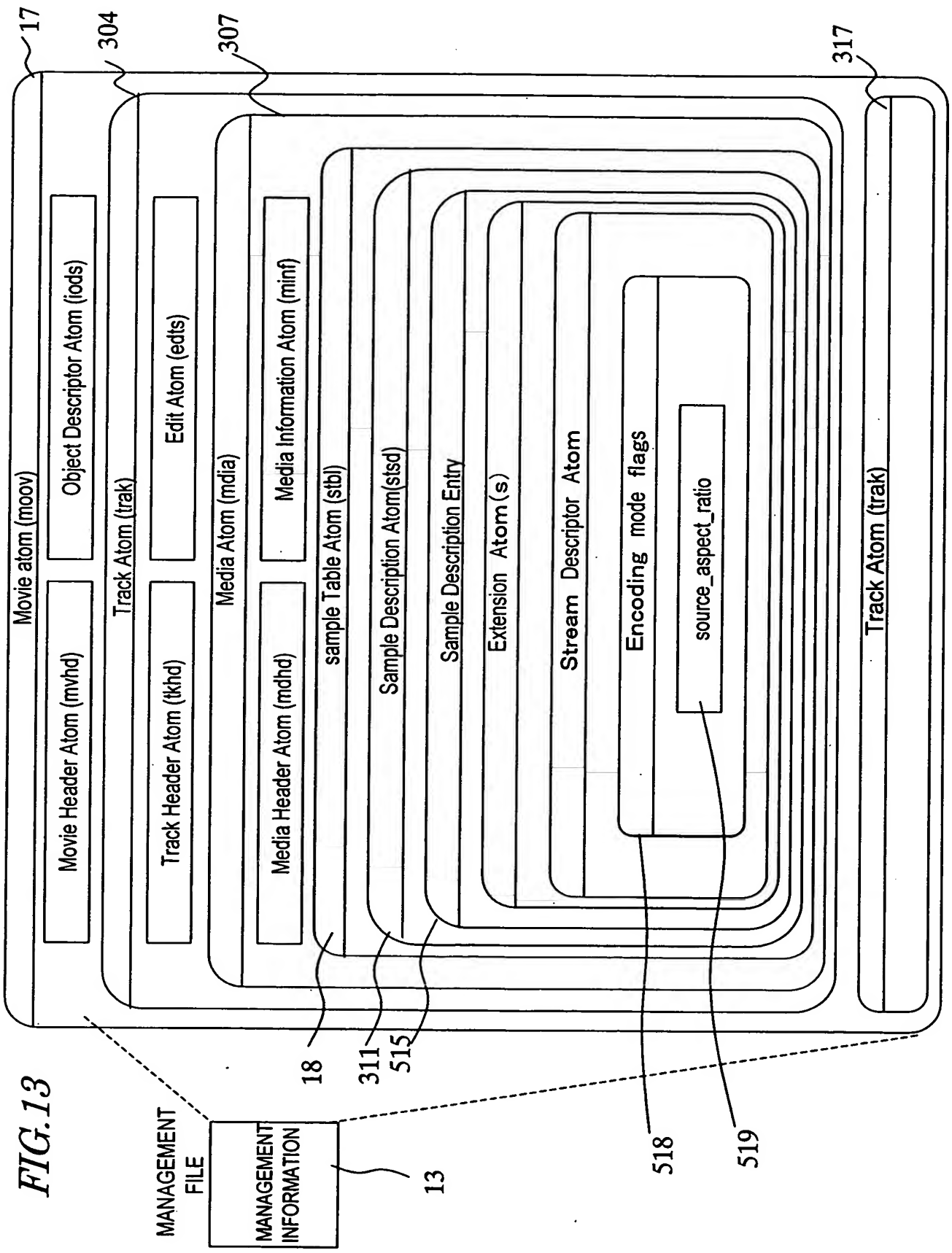

17
304
307
317
Movie atom (moov)
Movie Header Atom (mvhd)
Object Descriptor Atom (iods)
Track Atom (trak)
Track Header Atom (tkhd)
Edit Atom (edts)
Media Atom (mdia)
Media Header Atom (mdhd)
Media Information Atom (minf)
sample Table Atom (stbl)
Sample Description Atom(stsd)
Sample Description Entry
Extension Atom(s)
Stream Descriptor Atom
Encoding mode flags
source_aspect_ratio
Track Atom (trak)
18
311
515
518
519
MANAGEMENT FILE
MANAGEMENT INFORMATION
13

FIG. 13

FIG. 14

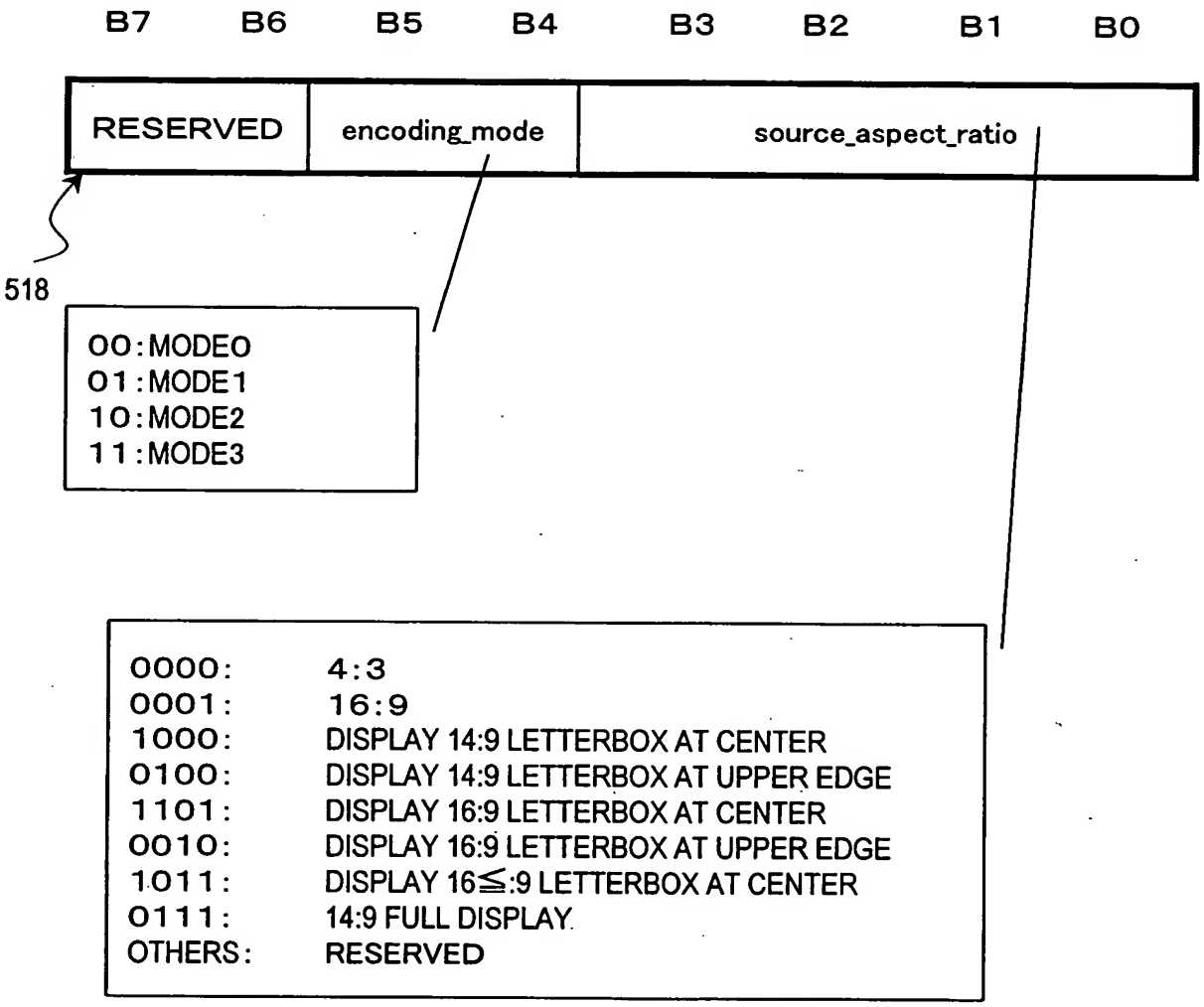

B7
B6
B5
B4
B3
B2
B1
B0
RESERVED
encoding_mode
source_aspect_ratio
518
00:MODE0
01:MODE1
10:MODE2
11:MODE3
0000: 4:3
0001: 16:9
1000: DISPLAY 14:9 LETTERBOX AT CENTER
0100: DISPLAY 14:9 LETTERBOX AT UPPER EDGE
1101: DISPLAY 16:9 LETTERBOX AT CENTER
0010: DISPLAY 16:9 LETTERBOX AT UPPER EDGE
1011: DISPLAY 16≦:9 LETTERBOX AT CENTER
0111: 14:9 FULL DISPLAY
OTHERS: RESERVED

FIG.15

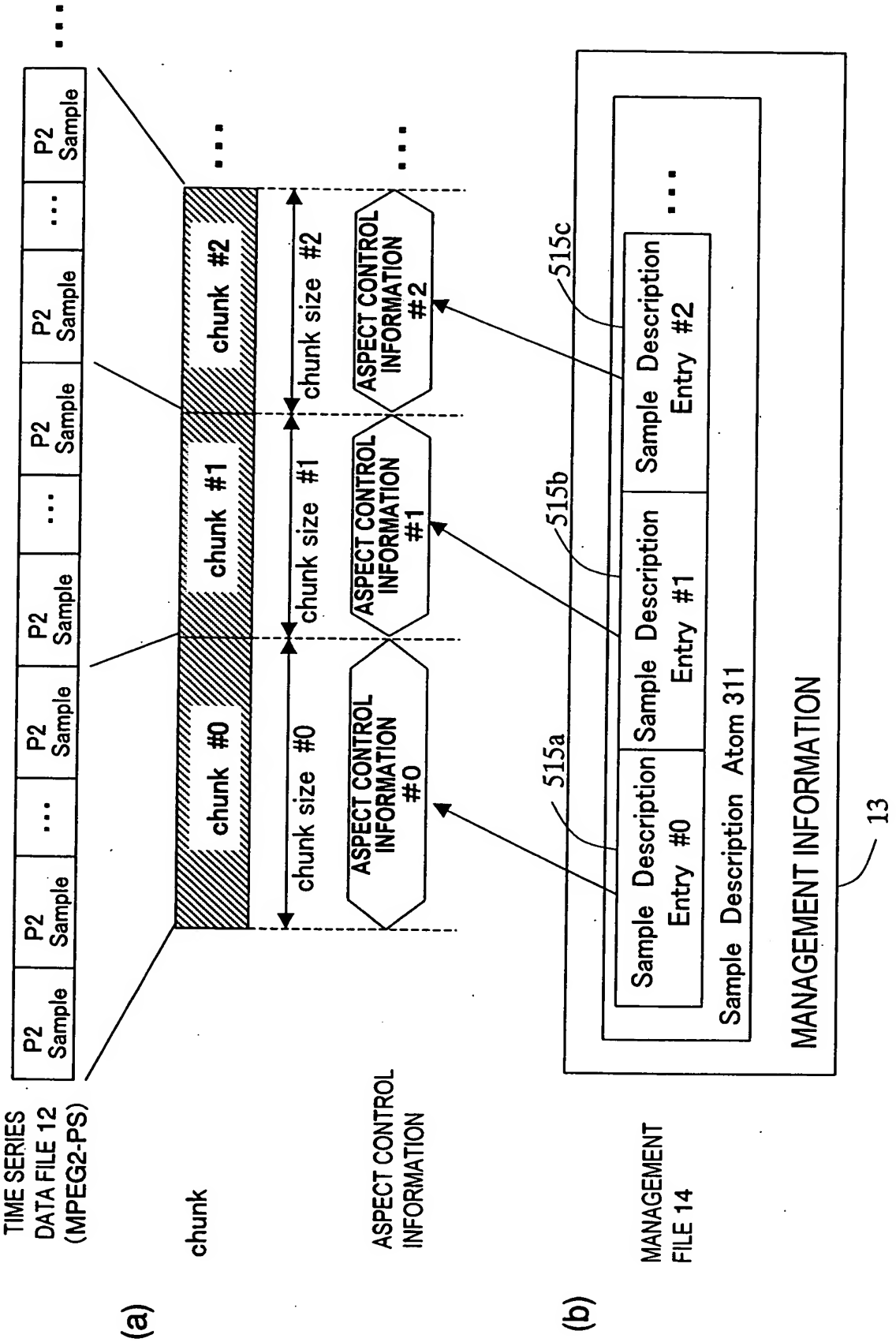

(a)
TIME SERIES DATA FILE 12 (MPEG2-PS)
P2 Sample
chunk
chunk #0
chunk #1
chunk #2
chunk size #0
chunk size #1
chunk size #2
ASPECT CONTROL INFORMATION
ASPECT CONTROL INFORMATION #0
ASPECT CONTROL INFORMATION #1
ASPECT CONTROL INFORMATION #2
(b)
MANAGEMENT FILE 14
MANAGEMENT INFORMATION
13
Sample Description Atom 311
Sample Description Entry #0
Sample Description Entry #1
Sample Description Entry #2
515a
515b
515c

FIG.16

LOCATION INFORMATION #0	ACCESS INFORMATION #0	ASPECT CONTROL INFORMATION #0
LOCATION INFORMATION #1	ACCESS INFORMATION #1	ASPECT CONTROL INFORMATION #1
LOCATION INFORMATION #2	ACCESS INFORMATION #2	ASPECT CONTROL INFORMATION #2
⋮		
LOCATION INFORMATION #N	ACCESS INFORMATION #N	ASPECT CONTROL INFORMATION #N
⋮		

INFORMATION SHARING/ MANAGEMENT AREA

FIG.17

LOCATION INFORMATION #0	ACCESS INFORMATION #0
LOCATION INFORMATION #1	ACCESS INFORMATION #1
LOCATION INFORMATION #2	ACCESS INFORMATION #2
⋮	

ACCESS INFORMATION MANAGEMENT AREA

INTERVAL INFORMATION #a	ASPECT CONTROL INFORMATION #a
INTERVAL INFORMATION #b	ASPECT CONTROL INFORMATION #b
INTERVAL INFORMATION #c	ASPECT CONTROL INFORMATION #c
⋮	

ASPECT CONTROL INFORMATION MANAGEMENT AREA

FIG. 18

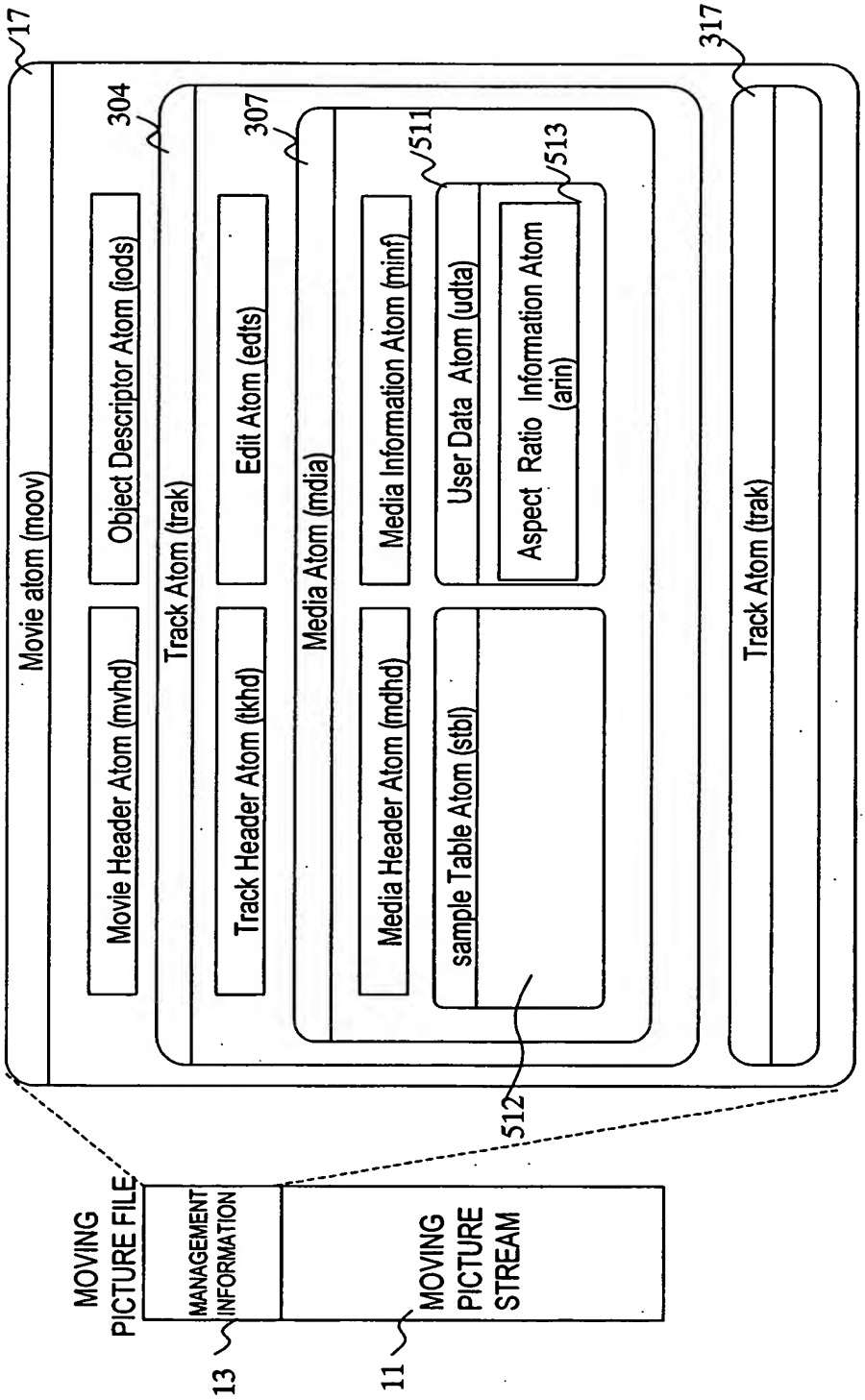

MOVING PICTURE FILE
MANAGEMENT INFORMATION
MOVING PICTURE STREAM
13
11
Movie atom (moov)
17
Movie Header Atom (mvhd)
Object Descriptor Atom (iods)
304
Track Atom (trak)
Track Header Atom (tkhd)
Edit Atom (edts)
307
Media Atom (mdia)
Media Header Atom (mdhd)
Media Information Atom (minf)
511
sample Table Atom (stbl)
User Data Atom (udta)
513
Aspect Ratio Information Atom (arin)
512
317
Track Atom (trak)

FIG. 19

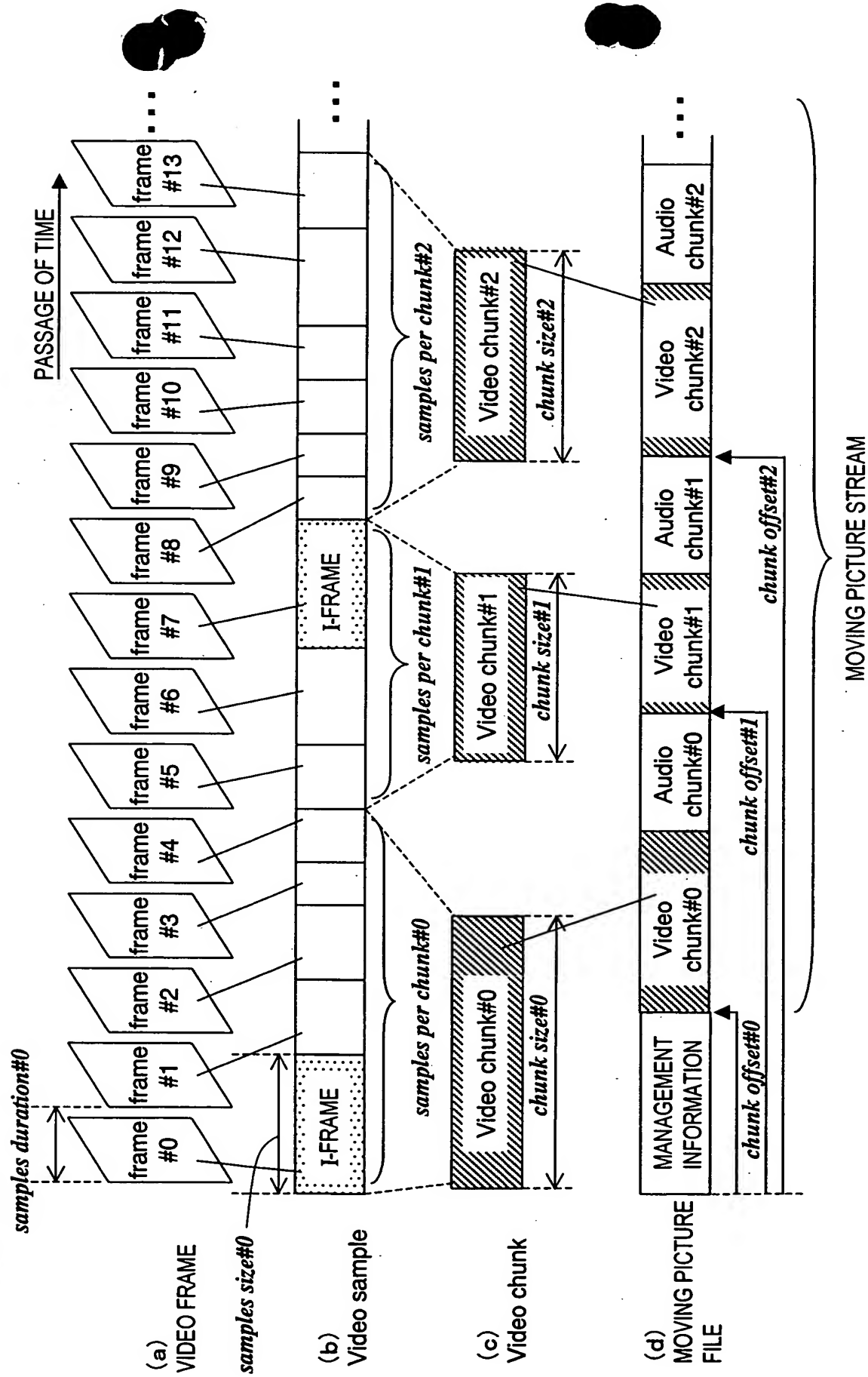

PASSAGE OF TIME
frame #0
frame #1
frame #2
frame #3
frame #4
frame #5
frame #6
frame #7
frame #8
frame #9
frame #10
frame #11
frame #12
frame #13
samples duration#0
samples size#0
(a) VIDEO FRAME
I-FRAME
samples per chunk#0
samples per chunk#1
samples per chunk#2
(b) Video sample
Video chunk#0
Video chunk#1
Video chunk#2
chunk size#0
chunk size#1
chunk size#2
(c) Video chunk
MANAGEMENT INFORMATION
Video chunk#0
Audio chunk#0
Video chunk#1
Audio chunk#1
Video chunk#2
Audio chunk#2
chunk offset#0
chunk offset#1
chunk offset#2
(d) MOVING PICTURE FILE
MOVING PICTURE STREAM

FIG.20

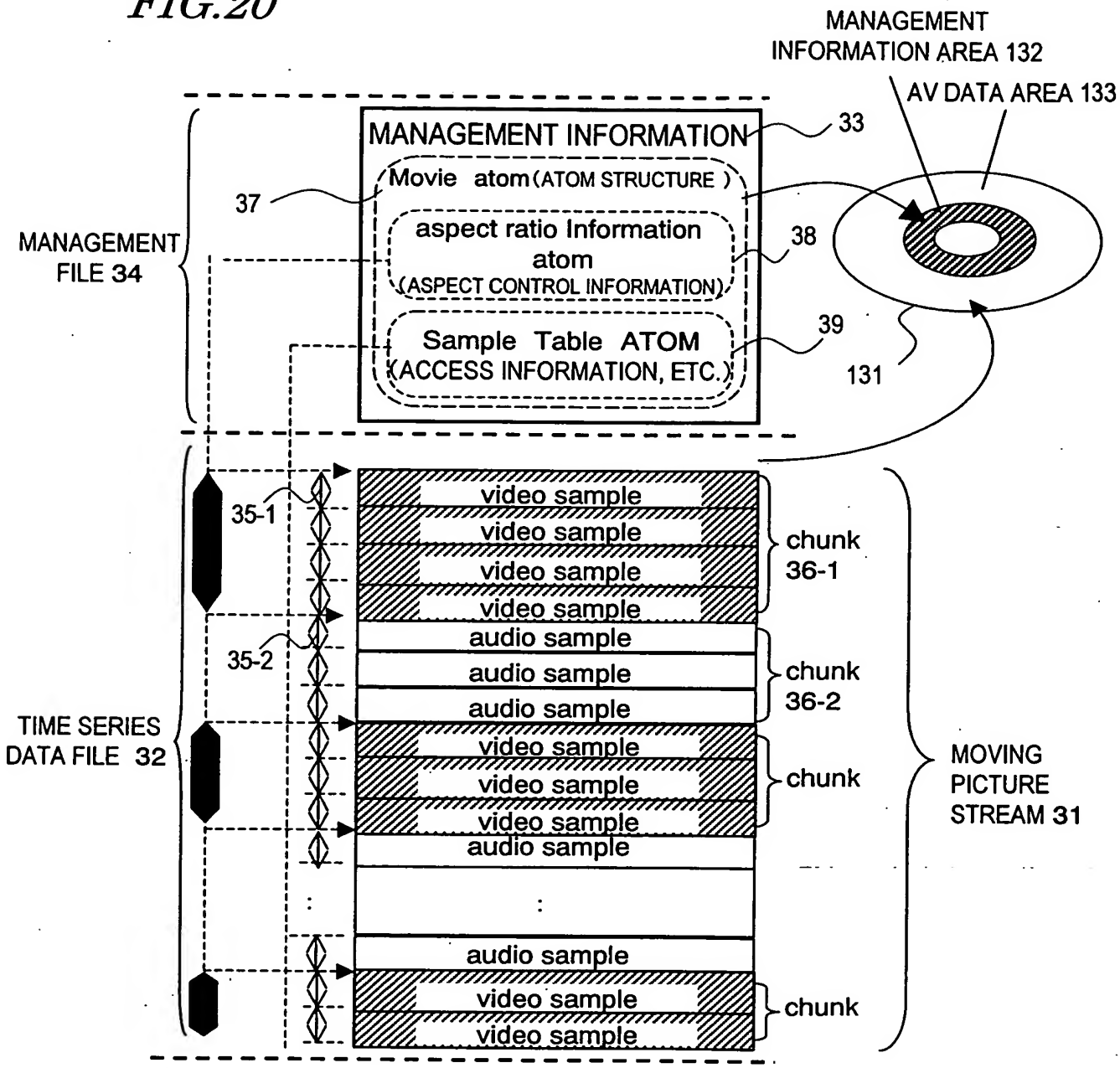

MANAGEMENT INFORMATION AREA 132
AV DATA AREA 133
MANAGEMENT INFORMATION
33
Movie atom (ATOM STRUCTURE)
37
aspect ratio Information atom
(ASPECT CONTROL INFORMATION)
38
Sample Table ATOM
(ACCESS INFORMATION, ETC.)
39
131
MANAGEMENT FILE 34
35-1
35-2
TIME SERIES DATA FILE 32
video sample
audio sample
chunk 36-1
chunk 36-2
chunk
MOVING PICTURE STREAM 31

FIG.21

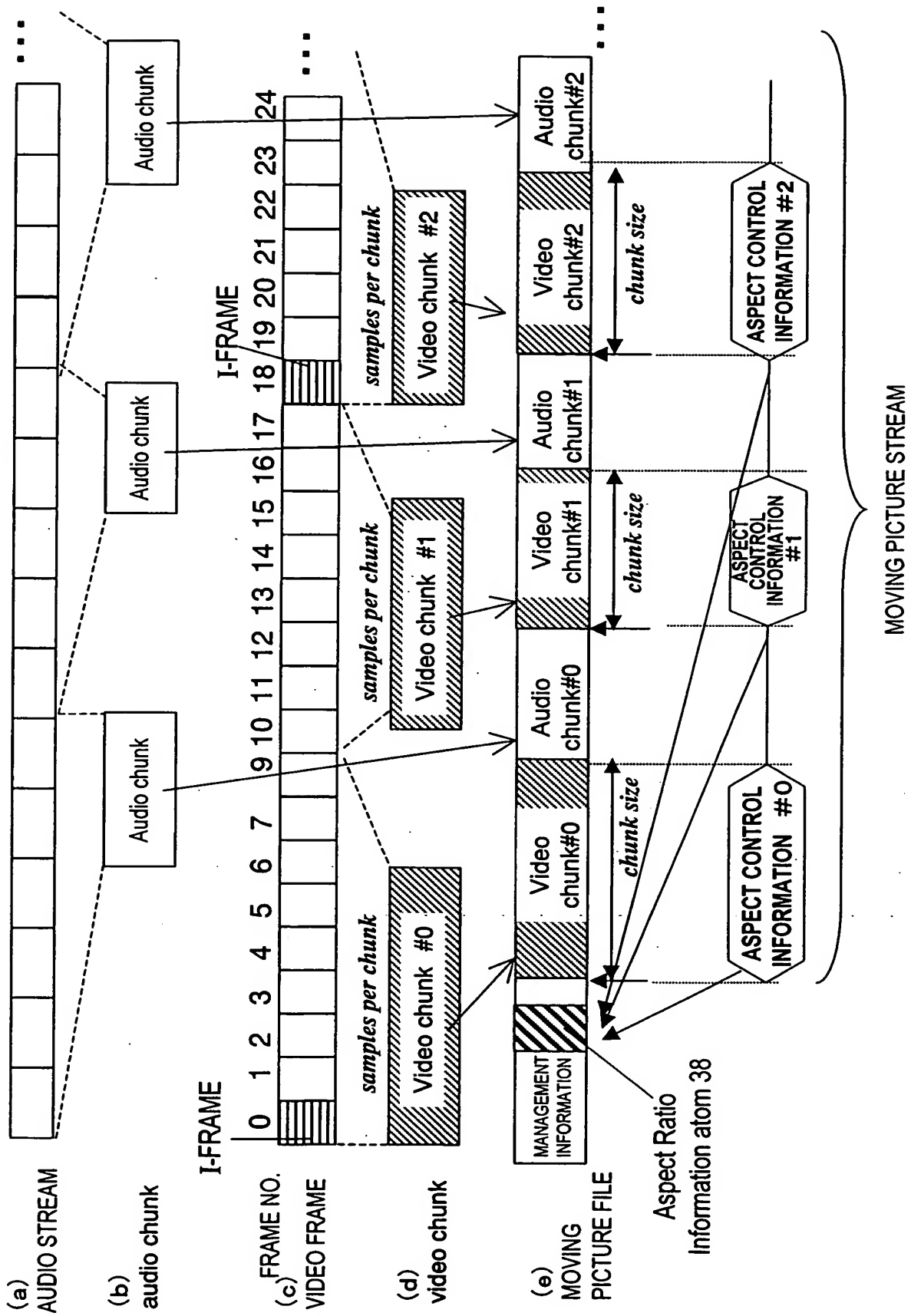

(a) AUDIO STREAM
(b) audio chunk
(c) FRAME NO. VIDEO FRAME
(d) video chunk
(e) MOVING PICTURE FILE
Audio chunk
Audio chunk
Audio chunk
I-FRAME
0 1 2 3 4 5 6 7 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
samples per chunk
samples per chunk
samples per chunk
Video chunk #0
Video chunk #1
Video chunk #2
MANAGEMENT INFORMATION
Audio chunk#0
Video chunk#0
Audio chunk#1
Video chunk#1
Audio chunk#2
Video chunk#2
chunk size
chunk size
chunk size
ASPECT CONTROL INFORMATION #0
ASPECT CONTROL INFORMATION #1
ASPECT CONTROL INFORMATION #2
Aspect Ratio Information atom 38
MOVING PICTURE STREAM

FIG.22

FIELD NAME	SIZE [bits]	CONTENTS
acces data Table (){		
video table (){		
num of chunks	32	NUMBER OF VIDEO CHUNKS IN MOVING PICTURE STREAM
(for i=0; i<num of chunk; i++){		
chunk offset	32	CHUNK OFFSET BYTE LOCATION COUNTED FROM TOP OF FILE
chunk size	32	NUMBER OF BYTES OF CHUNK
num of samples	8	NUMBER OF SAMPLES INCLUDED IN CHUNK
sync sample pos	8	LOCATION OF i-FRAME IN CHUNK (COUNTED FROM 1 AND 0 HAS NO i-FRAMES)
aspect Information	8	ASPECT CONTROL INFORMATION ABOUT MOVING PICTURE IN CHUNK
}		
audio table (){		
num of chunks	32	NUMBER OF AUDIO CHUNKS IN MOVING PICTURE STREAM
(for i=0; i<num of chunk; i++){		
chunk offset	32	CHUNK OFFSET BYTE LOCATION COUNTED FROM TOP OF FILE
chunk size	32	NUMBER OF BYTES OF CHUNK
num of sample	8	NUMBER OF SAMPLES INCLUDED IN CHUNK
}		
}		
}		

50

10/528165

FIG.23

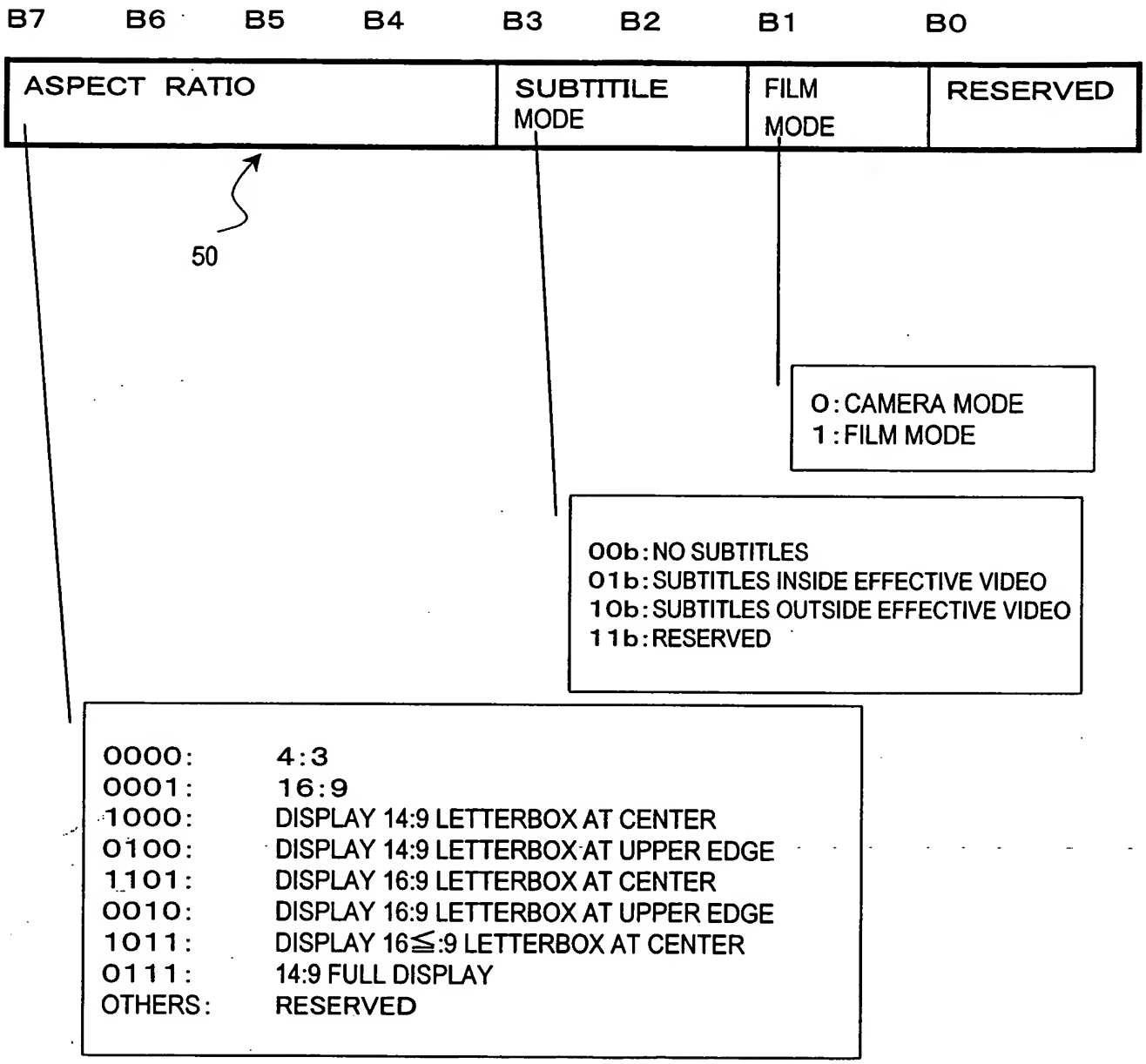

B7
B6
B5
B4
B3
B2
B1
B0
ASPECT RATIO
SUBTITILE MODE
FILM MODE
RESERVED
50
0: CAMERA MODE
1: FILM MODE
00b: NO SUBTITLES
01b: SUBTITLES INSIDE EFFECTIVE VIDEO
10b: SUBTITLES OUTSIDE EFFECTIVE VIDEO
11b: RESERVED
0000: 4:3
0001: 16:9
1000: DISPLAY 14:9 LETTERBOX AT CENTER
0100: DISPLAY 14:9 LETTERBOX AT UPPER EDGE
1101: DISPLAY 16:9 LETTERBOX AT CENTER
0010: DISPLAY 16:9 LETTERBOX AT UPPER EDGE
1011: DISPLAY 16≦:9 LETTERBOX AT CENTER
0111: 14:9 FULL DISPLAY
OTHERS: RESERVED

FIG.24

(a)

FIELD NAME	SIZE [bits]	CONTENTS
acces data Table (){		
video table (){		
num of chunks	32	NUMBER OF VIDEO CHUNKS IN MOVING PICTURE STREAM
(for i=0; i<num of chunk; i++){		
chunk offset	32	CHUNK OFFSET BYTE LOCATION COUNTED FROM TOP OF FILE
chunk size	32	NUMBER OF BYTES OF CHUNK
num of samples	8	NUMBER OF SAMPLES INCLUDED IN CHUNK
sync sample pos	8	LOCATION OF i-FRAME IN CHUNK (COUNTED FROM 1 AND 0 HAS NO i-FRAMES)
}		
}		

(b)

FIELD NAME	SIZE [bits]	CONTENTS
aspect table (){		
num of aspect_info	32	NUMBER OF CHANGE POINTS OF ASPECT INFORMATION IN MOVING PICTURE STREAM
(for i=0; num of aspect_info; i++){		
chunk_id	32	VALUE OF ASSOCIATED CHUNK
aspect_info	8	ASPECT CONTROL INFORMATION ABOUT MOVING PICTURE IN CHUNK
}		
}		

10/528165

FIG.25

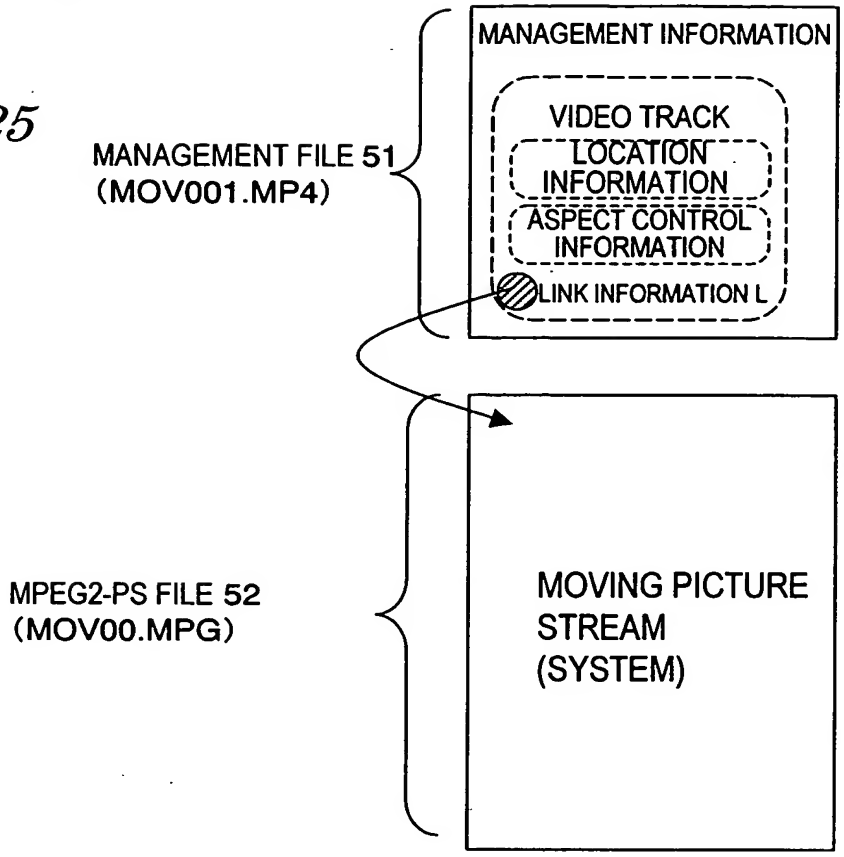

MANAGEMENT INFORMATION
VIDEO TRACK
LOCATION INFORMATION
ASPECT CONTROL INFORMATION
LINK INFORMATION L
MANAGEMENT FILE 51
(MOV001.MP4)
MPEG2-PS FILE 52
(MOV00.MPG)
MOVING PICTURE STREAM
(SYSTEM)

FIG.26

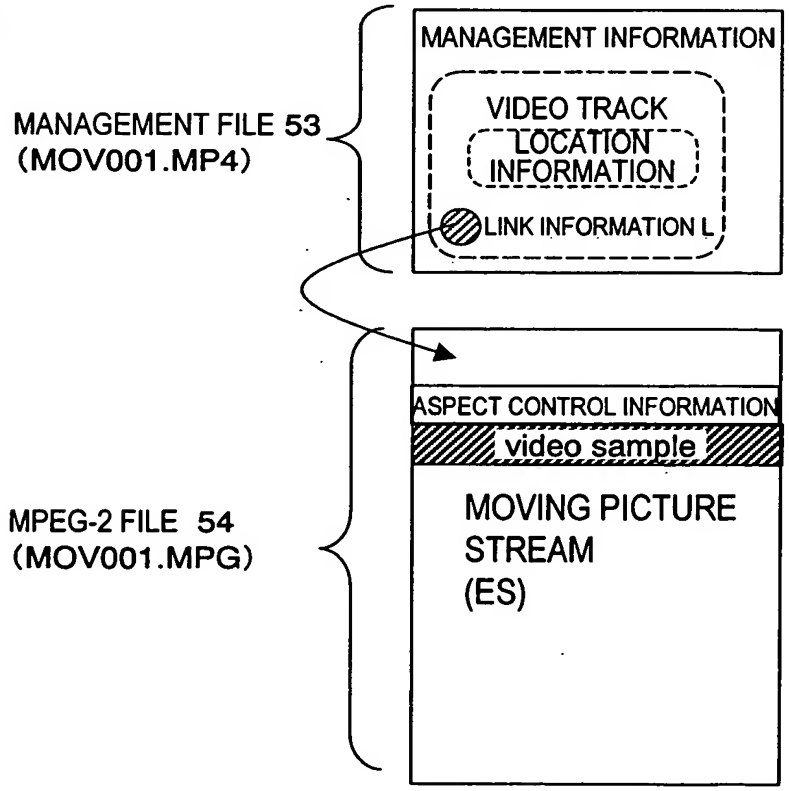

MANAGEMENT INFORMATION
VIDEO TRACK
LOCATION INFORMATION
LINK INFORMATION L
MANAGEMENT FILE 53
(MOV001.MP4)
ASPECT CONTROL INFORMATION
video sample
MOVING PICTURE STREAM
(ES)
MPEG-2 FILE 54
(MOV001.MPG)

FIG.27

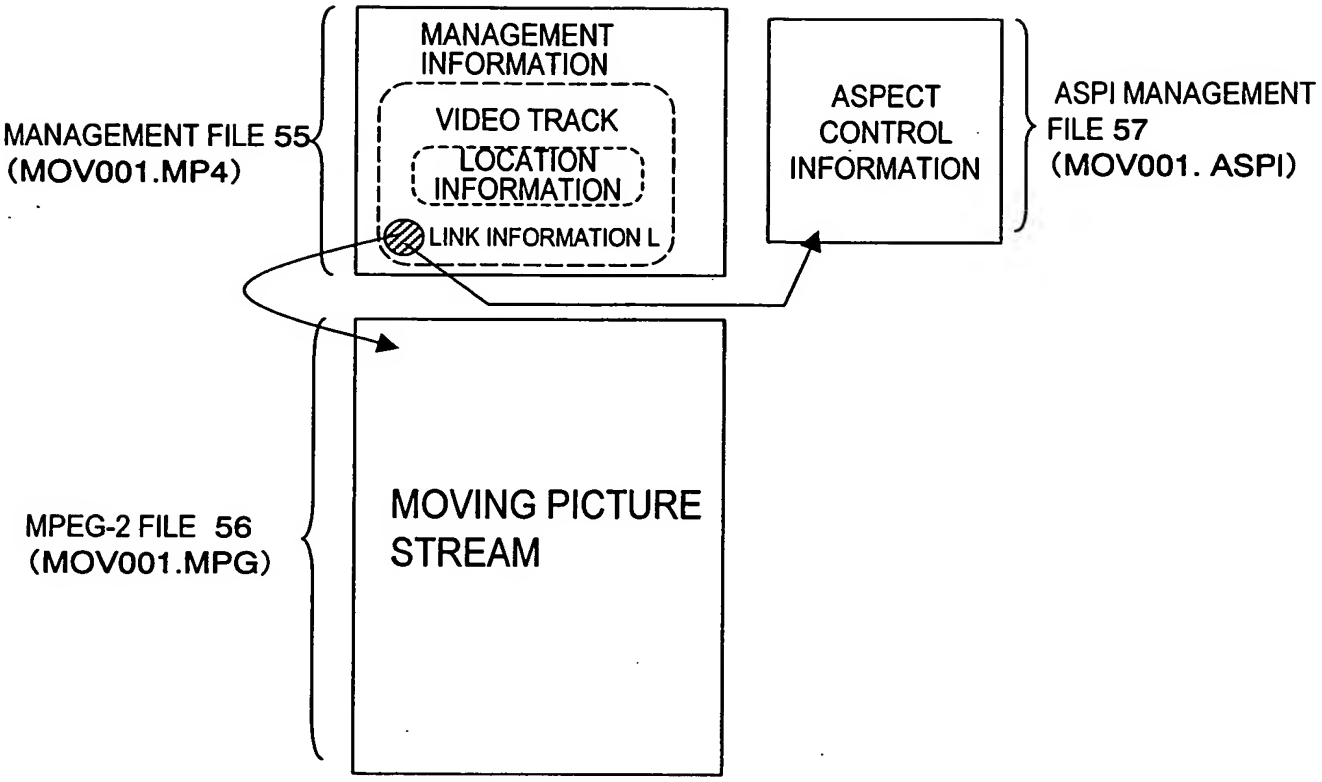

MANAGEMENT INFORMATION
VIDEO TRACK
LOCATION INFORMATION
LINK INFORMATION L
MANAGEMENT FILE 55
(MOV001.MP4)
ASPECT CONTROL INFORMATION
ASPI MANAGEMENT FILE 57
(MOV001. ASPI)
MOVING PICTURE STREAM
MPEG-2 FILE 56
(MOV001.MPG)

FIG.28

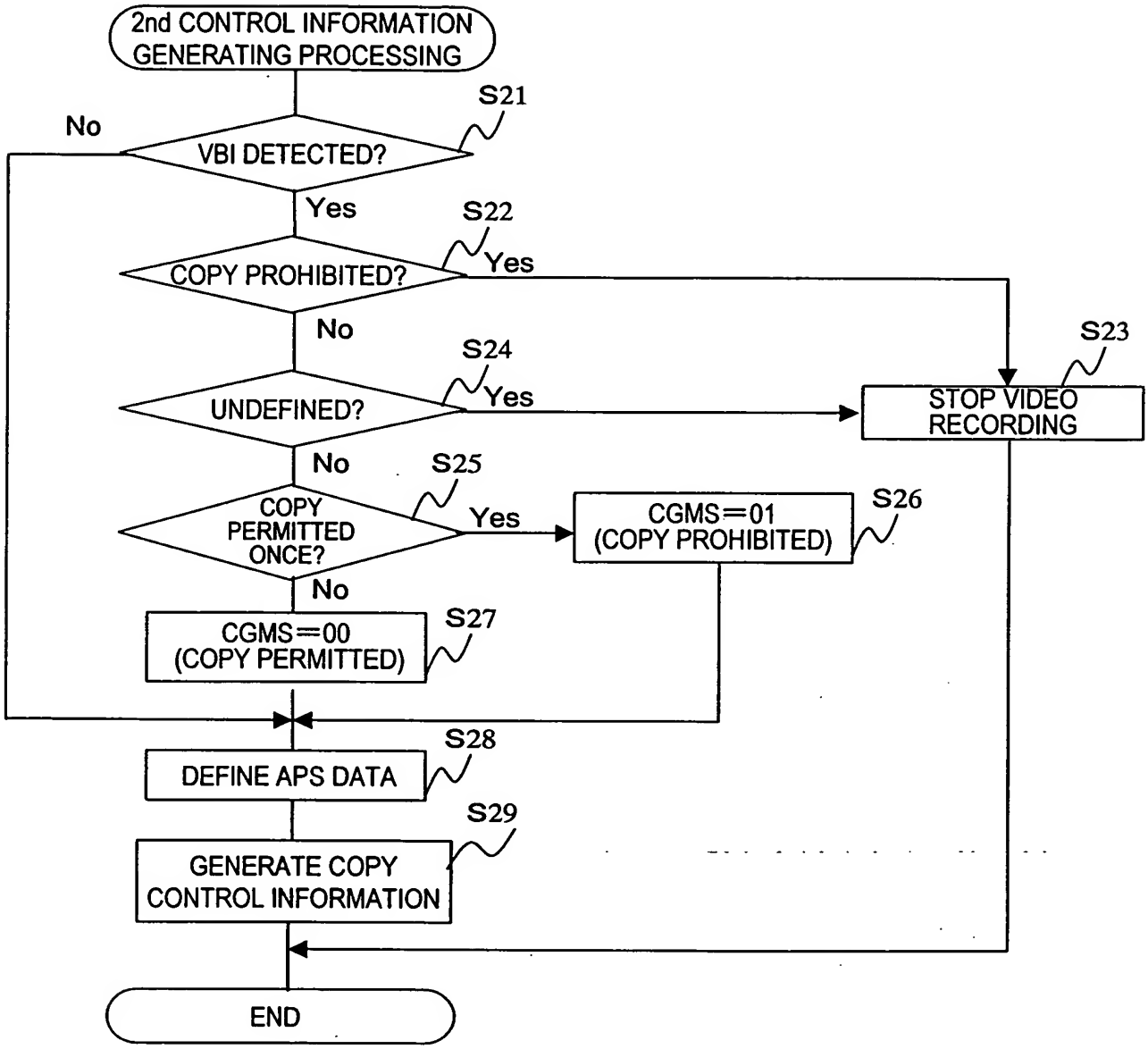

2nd CONTROL INFORMATION GENERATING PROCESSING
S21
No
VBI DETECTED?
Yes
S22
COPY PROHIBITED?
Yes
No
S24
UNDEFINED?
Yes
S23
STOP VIDEO RECORDING
No
S25
COPY PERMITTED ONCE?
Yes
CGMS=01 (COPY PROHIBITED)
S26
No
CGMS=00 (COPY PERMITTED)
S27
S28
DEFINE APS DATA
S29
GENERATE COPY CONTROL INFORMATION
END

FIG.29

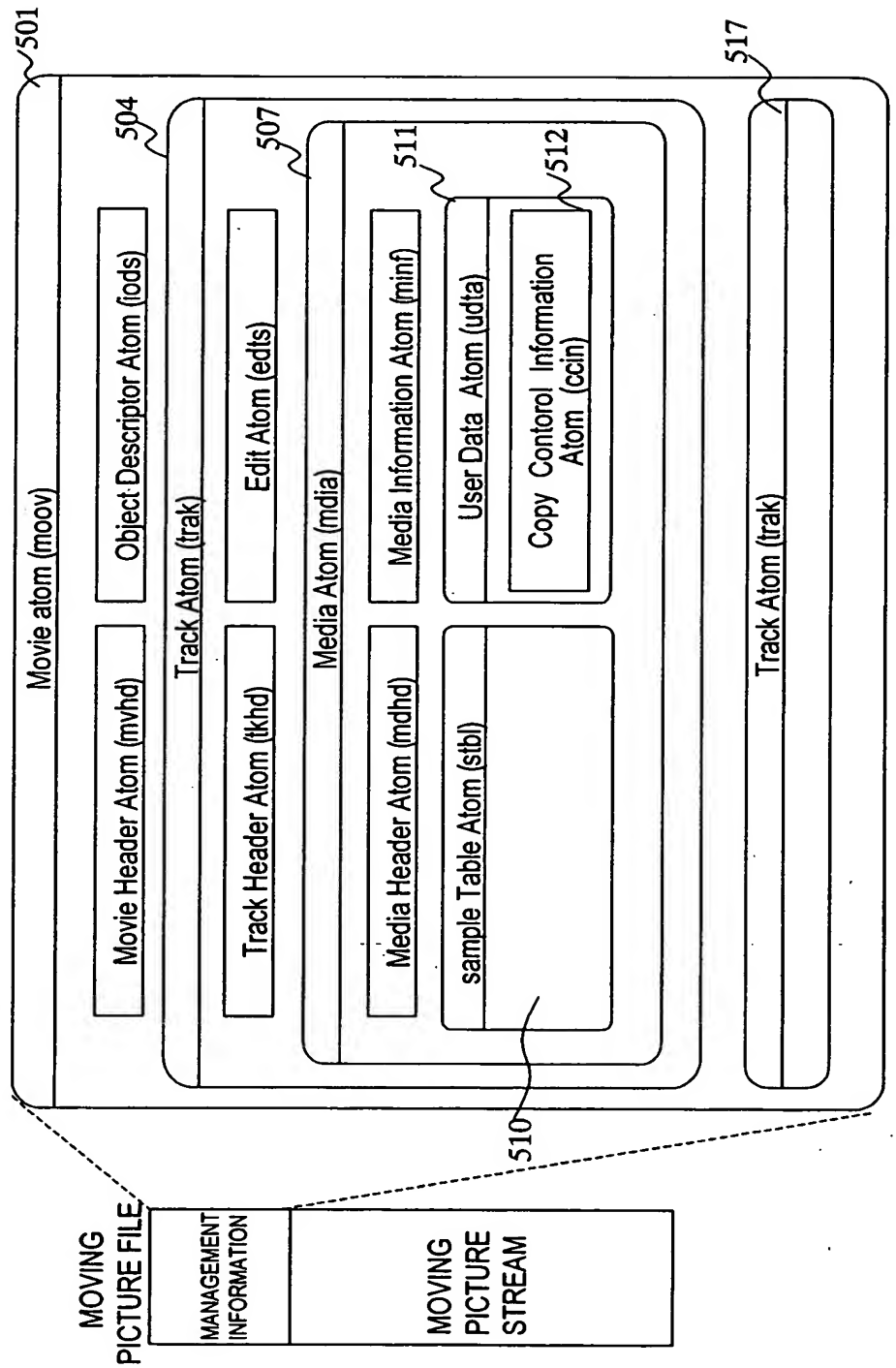

MOVING PICTURE FILE
MANAGEMENT INFORMATION
MOVING PICTURE STREAM
Movie atom (moov)
Movie Header Atom (mvhd)
Object Descriptor Atom (iods)
Track Atom (trak)
Track Header Atom (tkhd)
Edit Atom (edts)
Media Atom (mdia)
Media Header Atom (mdhd)
Media Information Atom (minf)
sample Table Atom (stbl)
User Data Atom (udta)
Copy Contorol Information Atom (ccin)
Track Atom (trak)
501
504
507
510
511
512
517

FIG.30

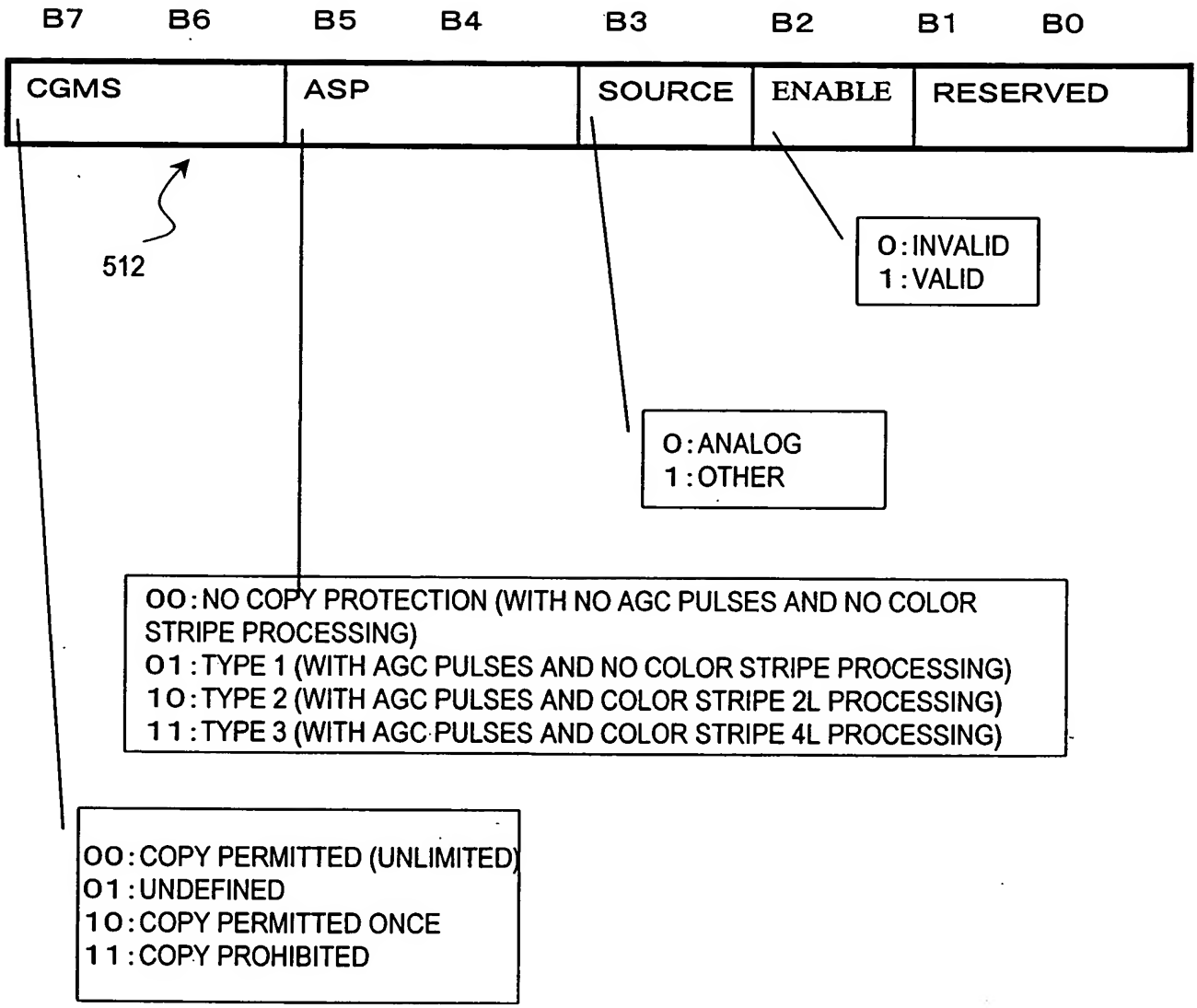
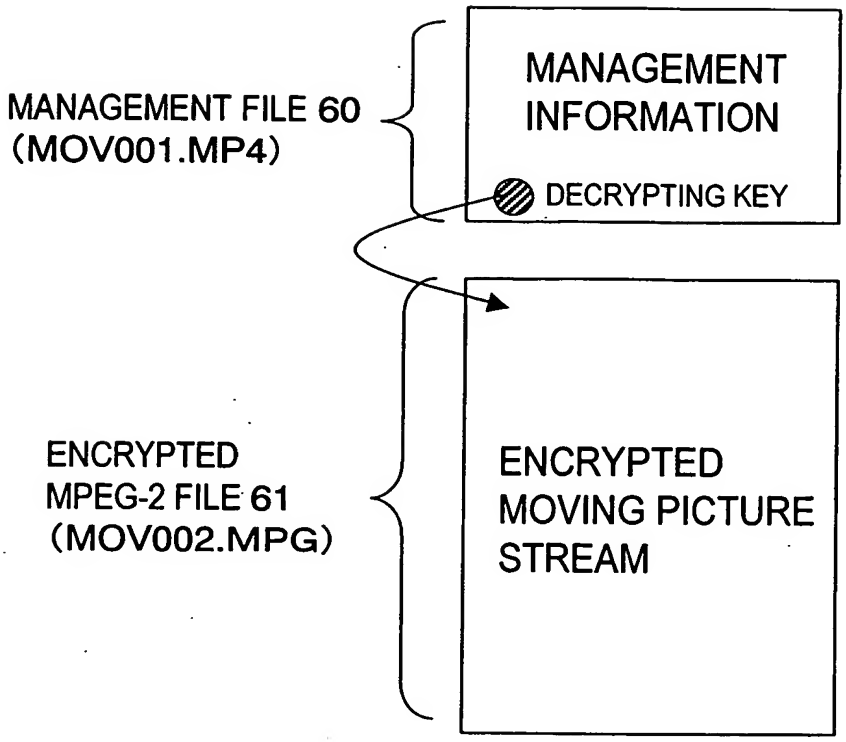

B7
B6
B5
B4
B3
B2
B1
B0
CGMS
ASP
SOURCE
ENABLE
RESERVED
512
0:INVALID
1:VALID
0:ANALOG
1:OTHER
00:NO COPY PROTECTION (WITH NO AGC PULSES AND NO COLOR STRIPE PROCESSING)
01:TYPE 1 (WITH AGC PULSES AND NO COLOR STRIPE PROCESSING)
10:TYPE 2 (WITH AGC PULSES AND COLOR STRIPE 2L PROCESSING)
11:TYPE 3 (WITH AGC PULSES AND COLOR STRIPE 4L PROCESSING)
00:COPY PERMITTED (UNLIMITED)
01:UNDEFINED
10:COPY PERMITTED ONCE
11:COPY PROHIBITED

FIG.31


MANAGEMENT FILE 60
(MOV001.MP4)
MANAGEMENT INFORMATION
DECRYPTING KEY
ENCRYPTED MPEG-2 FILE 61
(MOV002.MPG)
ENCRYPTED MOVING PICTURE STREAM